REMARKS

With claims 5-8, 16-17, 20-21, 25-26 and 32-33 previously pending, the present Response adds new claims 34-36. Provided below are Applicant's remarks in reply to the Office Action of April 13, 2005.

Section 103 Rejection

Claims 5-8, 16 and 32-33 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Patel et al. (U.S. Patent No. 6,550,263, hereafter "Patel") in view of Smith et al. (U.S. Patent No. 6,184,065, hereafter "Smith"). The Office Action states that Patel teaches a cooling assembly comprising: an electronic package 405 shown in Figs. 5-6 having a cavity 409; a plurality of dies 401; a bottom substrate 403 wherein active electronic components face the bottom surface 403 and a coolant surrounding interconnects within the cavity 409; an inlet 411 and an outlet 413 coolant ports that allow the coolant to enter the cavity 409, wherein each die has at least one active surface associated with respective active electronic components, and wherein the coolant is circulated in the cavity so the coolant directly cools each active surface of each die 401. The Office Action continues stating that Patel uses wire connectors to connect die 401 to circuit board 403, but does not teach that the connectors are spring contacts made using lithography. The Office Action states that Smith, however teaches such photo lithographically patterned spring contacts, and that it would be obvious to employ the spring contacts of Smith in the device of Patel "in order to employ a known technologically advanced type of electrical contacts." Applicant respectfully traverses this rejection.

Applicant maintains that a person of ordinary skill would have no motivation to combine the device of Patel with Smith. Patel discloses a packaged die as "chip" 401 with leads extending from the "chip" or component 401 into the substrate 403. See Patel col. 8, lines 16-24, where Patel describes the substrate 403 as "a substrate that receives one or more

components, typically by receiving a plurality of leads from each carried component." The leads are thus in the chip 401 and not associated with the substrate 403 in Patel, other than being inserted into the substrate 403. Substituting the leads of chip 401 of Patel with compliant interconnects of Smith, as described in the Office Action, makes no sense because the chip leads would flex and no longer be easily insertable into the substrate 403. The leads of chip 401 are not interchangable with flexible leads for at least this reason. Adding the spring contacts of Smith to the substrate 403 of Patel to connect to the leads on a chip 401, also makes no sense. Thus, there is no motivation for a person of ordinary skill to combine Patel and Smith as indicated by the Office Action. Claims 5-8, 16 and 32-33 are, therefore, believed allowable as non-obvious over Patel in view of Smith.

Further, the combination of Patel and Smith does not teach or suggest the invention, as claimed. Patel teaches the use of a spray cooling system to cool semiconductor devices (i.e. "chips"). See Patel, col. 1, lines 7-11. As shown in Fig. 2, "the spray mechanism 105 is configured to spray cooling fluid 117 onto the one or more chips 101, which heat and vaporize some, or more preferably all, of the cooling fluid." See Patel, col. 5, lines 30-32. "Preferably, the spray mechanism 105 is an incremental sprayer configured to eject an incremental amount of the cooling fluid on the chips." See Patel, col. 5, lines 36-38. Patel does not teach or suggest a continuous fluid flow, or immersing dies in fluid, as claimed. Patel further is concerned with cooling a top surface of the chip packages facing the sprayers, and does not teach or suggest that a bottom surface of active components can be effectively cooled. Patel doesn't disclose exposing active components or dies to coolant at all, only packages containing active components. Accordingly, claims 5-8, 16 and 32-33 are further believed allowable as non-obvious over Patel in view of Smith.

With regard to claims 5-7, 8 and 32, Patel, taken alone or in combination, does not teach or suggest "at least one coolant port that allows a coolant to <u>continuously</u> enter the cavity and directly cool the active electronic components of each die."

Claim 8 is further believed allowable because Patel does not teach or suggest "when the coolant circulates in the cavity the coolant directly cools each surface of each die," as claimed.

With regard to claim 16, Patel does not teach or suggest a package which "further comprises a bottom substrate on one side of the cavity, wherein each die with active electronic components is connected to the bottom substrate by the compliant interconnects, and wherein the active electronic components face the bottom substrate and contact coolant surrounding the compliant interconnects within the cavity."

With regard to claim 33, Patel does not teach or suggest "at least one die with active electronic components non-rigidly mounted on second ends of the compliant interconnects on a same surface of the at least one die having the active electronic components".

For at least the foregoing reasons, claims 5-8, 16 and 32-33 are all believed allowable as non-obvious over Patel in view of Smith.

Allowable Claims

Claims 17, 20-21 and 25-26 are indicated by the Office Action as allowed.

Conclusion

In light of the above amendments and remarks, claims 5-8, 16-17, 20-21, 25-26 and 32-36 are now all believed to be in condition for allowance. Accordingly, reconsideration and allowance of these claims is respectfully requested.

No fee is believed due with this response. Should a fee be due, the Commissioner is hereby authorized to charge the fee to Deposit Account No. 06-1325.

Respectfully submitted,

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